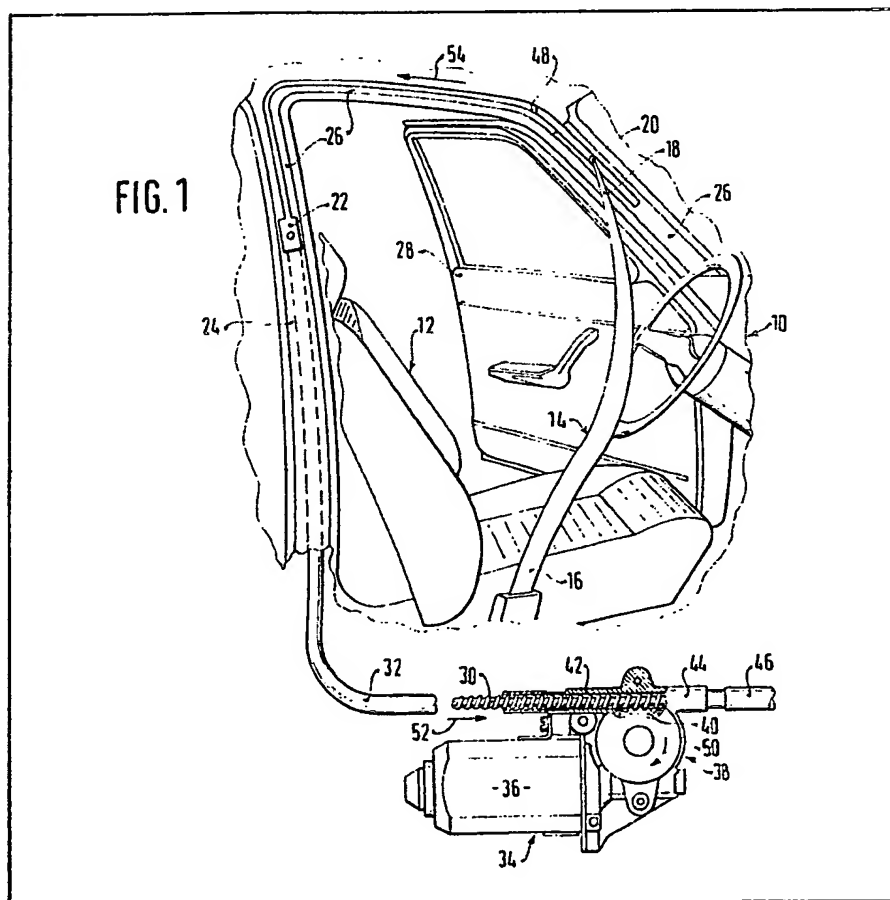


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## (54) Moving passive seat belts in motor vehicles

(57) Movement is transmitted to the movable belt end 18 by a flexible threaded cable 30 with which a driving element 40 (driven e.g. by a motor 36) is in engagement by way of the cable screw thread.



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FIG. 1

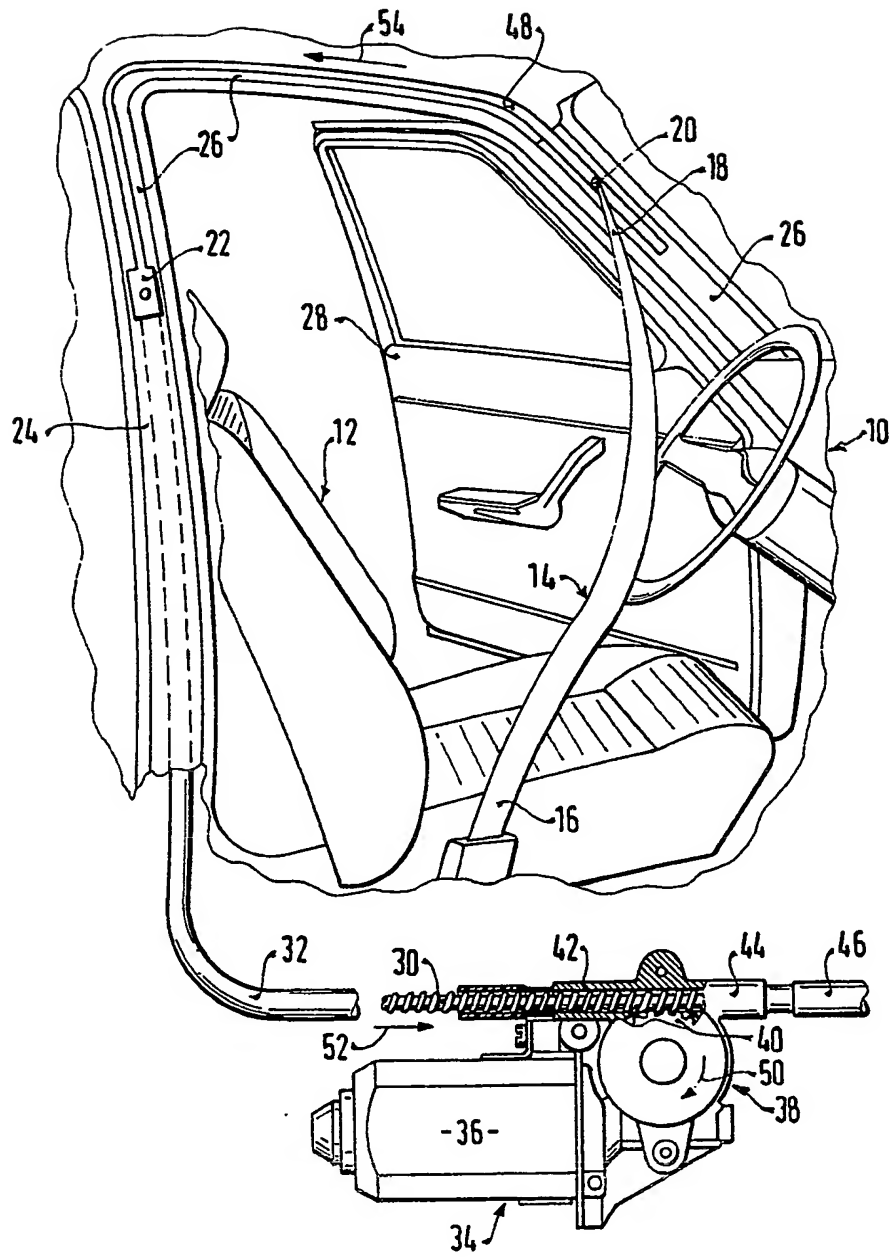
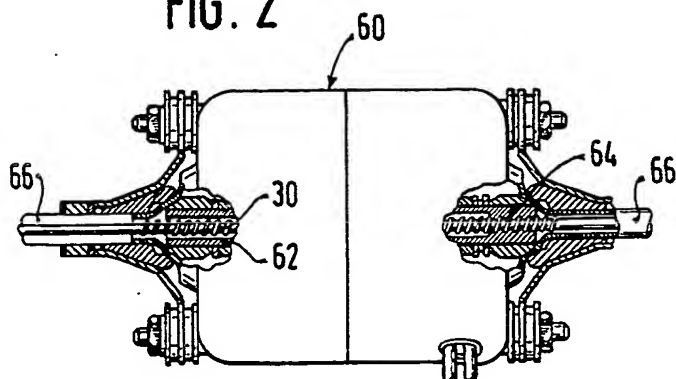


FIG. 2



## SPECIFICATION

### A unit for adjusting a seat belt in motor vehicles, between a tight and a loose position

#### State of the Art

- 5 The invention originates from a drive unit according to the preamble to the main claim. Such a drive unit is already known in which the movement transmission means are formed by a cable which is moved over a cable drum. A relatively large amount of room is required with this arrangement because the deviation of the cable takes place over rollers. The cost of assembly of this arrangement is also very high. Moreover, difficulties are produced with the known unit during reeling in of the cable because the increased friction needs to be overcome.

#### Advantages of the Invention

- As opposed to this, the unit in accordance with the invention comprising the characterising features of the main claim has the advantage that it is designed to be economical and space saving and the use of a cable which needs to be reeled in is avoided.

#### Drawing

- 25 Embodiments of the invention are illustrated in the drawing and are described in detail in the following specification. Figure 1 shows a view of the driving seat of a motor vehicle wherein a seat belt is adjustable by a unit in accordance with the invention having a gear wheel meshing with a threaded cable and Figure 2 is the driving motor of another arrangement in which the threaded cable is screwed through the hollow motor shaft provided with a female thread.

#### 35 Description of the Embodiments

- One end 16 of a seat belt 14 associated with a seat 12 arranged in the passenger compartment of a motor vehicle 10 is rigidly connected to the body of the motor vehicle 10. The other end 18 of the seat belt 14 can be brought from its illustrated loose position into a tight position in which one half lock 20 connected to the end 18 can be brought into a second half lock 22 associated therewith and rigidly connected to the vehicle body. The second lock half is located in a pillar 24 of a door frame 26 which is associated with a door 28 leading into the passenger compartment. A flexible threaded cable is arranged in the door frame 26. The threaded cable 30 is guided in a tube 32 which extends from the region of the illustrated loose position of the seat belt 14 through the second lock half 22 up to a drive mechanism 34 which is formed by an electric motor 36 and a step down drive 38 connected thereto. The drive mechanism 34 has a pinion 40 serving as a driving element which meshes with the threaded cable 30. The guide tube 32 for the threaded cable 30, preferably made of a plastics material, is connected to a guide bush 42 on the gear housing which is opposite a second guide bush 44 which is likewise connected to a guide

- 65 tube 46. The arrangement of the guide bushes 42 and 44 is so designed that the threaded cable 30 extends substantially parallel to the longitudinal axis of the electric motor 36. The drive mechanism 34 is preferably arranged in the pillar 24 or in another region of the door frame. Apart from guiding the flexible threaded cable, the tubes 32 and 46 serve to guarantee a secure arrangement of the pinion 40 in the screw thread of the threaded cable 30. The lock half 20 is rigidly connected to the end region of the threaded cable 30. Moreover, the guide tube 32 has a longitudinal slot which extends from the loose position up to the second lock half 22. Between the loose position and the second lock half 22, the door frame 26 is also provided with a slot 48 which provides a passage for the lock half 20 up to the threaded cable 30. When it is desired to change the seat belt 14 from its loose position to its tight position the electric motor is driven so that the pinion 40 rotates in the sense of the arrow 50. The threaded cable 30 is moved in the direction of the arrow 52 thereby and is accommodated in the guide tube 46. Upon movement of the threaded cable 30, the first lock half 20 is also moved until it latches with the second lock half 22 in the pillar 24 of the door frame. At this instant, a limit switch (not shown) switches off the electric motor 36 and the belt 14 is fixed in its tight position. In order to loosen the seat belt 14, the motor 36 is driven so that the pinion 40 rotates in the sense opposite to the arrow 50. In so doing, the threaded cable 30 is moved in the guide tube 32 in the direction opposite to the arrow 52 whereby the first lock half 20, together with the end 18 of the seat belt, is moved out of the tight position towards the loose position. When the first lock half together with the seat belt arrives in the illustrated loose position, a limit switch (likewise not shown) switches off the electric motor 36.

- In the arrangement illustrated in Figure 2, the electric driving motor 60 is provided with a hollow armature shaft 62. In the region of one open end of the armature shaft 62, the longitudinal bore is narrowed and is formed as a female thread 64. The female thread 64 is matched to the thread of the threaded cable 30. In this case, the threaded cable 30 is of course guided in the guide tube 66.

- According to the sense of rotation of the electric motor 60, the threaded cable 30 is screwed in one direction or the other by the electric motor and is thus moved in its longitudinal direction. In so doing, the adjusting movement for the end 18 of the seat belt 14 or the lock half 20 connected to the seat belt is effected. The switching off of the electric motor 60 in its limit positions can also take place through appropriately arranged limit switches.

- It is apparent that, with both embodiments of the invention, the movement transmission means are formed by a flexible threaded cable 30 which is in engagement by way of its screw thread with the driving element (pinion 40 or female thread 64).

**CLAIMS**

1. A unit for adjusting a seat belt in motor vehicles between a tight and a loose position with a driving element which is connected through movement transmission means to one end of the seat belt, characterised in that, the movement transmission means are formed by a flexible threaded cable the driving element being in engagement with the cable screw thread.
2. A unit according to claim 1, characterised in that, the driving element is a pinion meshing with the threaded cable.
3. A unit according to claim 1, characterised in that, the driving element is a hollow shaft provided with a female screw thread matching the thread of the threaded cable and through which the threaded cable is guided.
4. A unit according to one of claims 1 to 3, characterised in that, the threaded cable is guided in a tube preferably made of a plastics material.
5. A unit according to claim 4, characterised in that, the tube is arranged in the vehicle body preferably in the door frame.
6. A unit according to one of claims 1 to 5,
- 25 characterised in that, the adjustable end of the seat belt is provided with a lock half which, in the tight position of the seat belt, latches with the other lock half fixed to the vehicle body.
7. A unit according to claim 6, characterised in that, at least between the tight and the loose position of the seat belt, the guide tube and the vehicle body are provided with a slot open towards the passenger compartment of the motor vehicle.
8. A unit according to claim 7, characterised in that, the end of the seat belt to be adjusted engages the threaded cable through the slot by an intermediate portion, preferably by a lock half.
9. A unit according to one of claims 1 to 8,
- 40 characterised in that, two limit position switches are arranged on the vehicle body, one of which signals the tight position and the other of which signals the loose position of the seat belt to a driving mechanism of the unit.
10. A seat belt adjusting unit substantially as herein described with reference to Figure 1 or Figure 2 of the accompanying drawings.